

Engineering Interpretations

Construction Material and Excavating

Soils are rated as sources for road fill, topsoil, sand, and gravel. Suitability ratings of good, fair, or poor are given for soils used as a source of road fill and topsoil. Ratings of probable and improbable are given for sand and gravel. A rating of probable means that on the basis of the available evidence, the source material is likely to be in or below the soil. A rating of improbable means that the source material is unlikely to be in or below the soil. The ratings for sand and gravel do not consider the quality of the source material because quality depends on how the source material is to be used.

Road Fill

Road fill consists of soil material that is excavated from its original position and used in road embankments elsewhere. The evaluations for road fill are for low embankments that generally are less than 6 feet in height and are less exacting in design than high embankments such as those along superhighways. The rating is given for the whole soil, from the surface to a depth of about 5 feet, based on the assumption that soil horizons will be mixed in loading, dumping, and spreading. Soils are rated as to the amount of material available for excavation, the ease of excavation, and how well the material performs after it is in place.

Sand

Sand as a construction material is usually defined as particles ranging in size from 0.074 mm (sieve #200) to 4.75 mm (sieve #4) in diameter. Sand is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the sand for specific purposes is not evaluated. If the lowest layer of the soil contains sand, the soil is rated as a probable source regardless of thickness. The assumption is that the sand layer below the depth of observation exceeds the minimum thickness.

Gravel

Gravel as a construction material is defined as particles ranging in size from 4.76 mm (sieve #4) to 76 mm (3 inches) in diameter.

Gravel is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the gravel for specific purposes is not evaluated. If the lowest layer of the soil contains gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil

The term "topsoil" has several meanings. As used here, the term describes soil material used to cover an area so as to improve soil conditions for establishment and maintenance of adapted vegetation. Generally, the upper part of the soil, which is richest in organic matter, is most desirable; however, material excavated from deeper layers is also used. In this rating, the upper 40 inches of soil material is evaluated for use as topsoil. In the

borrow area, the material below 40 inches is evaluated for its suitability for plant growth after the upper 40 inches is removed. The soil properties that are used to rate the soil as topsoil are those that affect plant growth, the ease of excavation, loading, and spreading, and those that affect the reclamation of the borrow area.

This subsection includes:

- **(a) Construction Materials and Excavating**

Howard County, Missouri: Detailed Soil Map Legend

10/03/2001

PAGE - 1 OF 13

Construction Materials and Excavating

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Br: Bremer-----	Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00 0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~too clayey (limited) ~wetness (moderately limited)	0.96 0.48	Very limited ~wetness (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	1.00 0.29 0.26
Ca: Carlow-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too clayey (very limited) ~wetness (very limited) ~too acid (slightly limited)	1.00 1.00 0.12	Very limited ~wetness (very limited) ~too clayey (limited) ~flooding (moderately limited)	1.00 0.70 0.60
Ch: Chariton-----	Limited ~wetness (limited) ~shrink-swell (limited)	0.86 0.81	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too clayey (very limited) ~wetness (limited)	1.00 0.86	Very limited ~wetness (very limited) ~too clayey (limited) ~cutbanks cave (slightly limited)	1.00 0.76 0.29
Ed: Edina-----	Very limited ~shrink-swell (very limited) ~wetness (limited)	1.00 0.96	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too clayey (very limited) ~wetness (limited)	1.00 0.96	Very limited ~wetness (very limited) ~too clayey (limited) ~cutbanks cave (slightly limited)	1.00 0.70 0.29
Fa: Fatima-----	Not limited		Very limited		Very limited		Not limited		Limited	

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Fr: Freeburg-----			~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00			~wetness (limited)	0.61
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29
	Slightly limited ~shrink-swell (slightly limited)	0.29	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Slightly limited ~wetness (slightly limited)	0.26	Very limited ~wetness (very limited)	1.00
GaC: Armstrong-----	~wetness (slightly limited)	0.26	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29
	Limited ~shrink-swell (limited)	0.98	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.94	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~cutbanks cave (slightly limited)	0.29
Gara-----							~small stones (slightly limited)	0.03	~too clayey (slightly limited)	0.24
	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.64	Slightly limited ~cutbanks cave (slightly limited)	0.29
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~too clayey (slightly limited)	0.08
GaD: Armstrong-----	Limited ~shrink-swell (limited)	0.98	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.94	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~slope (limited)	0.63
							~wetness (moderately limited)	0.48	~cutbanks cave (slightly limited)	0.29
Gara-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.64	Limited ~slope (limited)	0.63

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GcC3: Armstrong-----			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.08
	Limited		Very limited		Very limited		Limited		Very limited	
	~shrink-swell (limited)	0.98	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (limited)	0.94	~wetness (very limited)	1.00
Gara-----	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~cutbanks cave (slightly limited)	0.29
							~small stones (slightly limited)	0.03	~too clayey (slightly limited)	0.26
	Moderately limited		Very limited		Very limited		Limited		Slightly limited	
	~shrink-swell (moderately limited)	0.45	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (limited)	0.64	~cutbanks cave (slightly limited)	0.29
GnB: Greenton-----			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~too clayey (slightly limited)	0.08
	Limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (limited)	0.82	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~depth to bedrock (moderately limited)	0.42	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (slightly limited)	0.12	~too clayey (moderately limited)	0.45
GnC: Greenton-----	~wetness (slightly limited)	0.12							~cutbanks cave (slightly limited)	0.29
	Limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (limited)	0.82	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~depth to bedrock (moderately limited)	0.42	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (slightly limited)	0.12	~too clayey (moderately limited)	0.45
GnD: Greenton-----	~wetness (slightly limited)	0.12							~cutbanks cave (slightly limited)	0.29
	Limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (limited)	0.82	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~depth to bedrock (moderately limited)	0.42	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~slope (limited)	0.63

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrB: Grundy-----	~wetness (slightly limited)	0.12					~wetness (slightly limited)	0.12	~too clayey (moderately limited)	0.45
	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~too clayey (moderately limited) ~cutbanks cave (slightly limited)	0.45 0.29
GrC: Grundy-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~too clayey (moderately limited) ~cutbanks cave (slightly limited)	0.45 0.29
Gu: Gullied land---	Not rated		Not rated		Not rated		Not rated		Not rated	
HaB: Hatton-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.91	Very limited ~wetness (very limited)	1.00
	~wetness (slightly limited)	0.12	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too acid (slightly limited)	0.30	~cutbanks cave (slightly limited)	0.29
							~wetness (slightly limited)	0.12	~too clayey (slightly limited)	0.23
HaC: Hatton-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.91	Very limited ~wetness (very limited)	1.00
	~wetness (slightly limited)	0.12	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too acid (slightly limited)	0.30	~cutbanks cave (slightly limited)	0.29
							~wetness (slightly limited)	0.12	~too clayey (slightly limited)	0.23

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Hn: Haynie-----	Not limited		Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Slightly limited ~excess lime (slightly limited)	0.03	Moderately limited ~flooding (moderately limited) ~cutbanks cave (slightly limited)	0.60 0.29
Ho: Hodge-----	Not limited		Possible source ~possible source (thickest layer) ~possible source (bottom layer)	0.33 0.30	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too sandy (very limited)	1.00	Very limited ~cutbanks cave (very limited) ~flooding (moderately limited)	1.00 0.60
KnC: Knox-----	Not limited		Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Moderately limited ~too clayey (moderately limited)	0.50	Slightly limited ~cutbanks cave (slightly limited)	0.29
KnD3: Knox-----	Not limited		Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~slope (limited) ~too clayey (moderately limited)	0.63 0.50	Limited ~slope (limited) ~cutbanks cave (slightly limited)	0.63 0.29
KnE3: Knox-----	Limited ~slope (limited)	0.67	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~slope (very limited) ~too clayey (moderately limited)	1.00 0.50	Very limited ~slope (very limited) ~cutbanks cave (slightly limited)	1.00 0.29
LaB: Ladoga-----	Moderately limited ~shrink-swell (moderately limited)	0.33	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~too clayey (limited)	0.99	Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited) ~wetness (slightly limited)	0.29 0.27 0.15

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LaC: Ladoga-----	Moderately limited ~shrink-swell (moderately limited)	0.33	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Limited ~too clayey (limited)	0.99	Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited) ~wetness (slightly limited)	0.29 0.27 0.15
Le: Leta-----	Moderately limited ~wetness (moderately limited) ~shrink-swell (moderately limited)	0.48 0.43	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Very limited ~too clayey (very limited) ~wetness (moderately limited) ~too acid (slightly limited)	1.00 0.48 0.12	Very limited ~wetness (very limited) ~flooding (moderately limited) ~too clayey (moderately limited)	1.00 0.60 0.45
LnE: Lindley-----	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.67 0.45	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Very limited ~slope (very limited) ~too clayey (moderately limited)	1.00 0.50	Very limited ~slope (very limited) ~cutbanks cave (slightly limited)	1.00 0.29
LrE3: Lindley-----	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.67 0.45	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Very limited ~slope (very limited) ~too clayey (moderately limited)	1.00 0.50	Very limited ~slope (very limited) ~cutbanks cave (slightly limited)	1.00 0.29
LsC: Keswick-----	Limited ~shrink-swell (limited) ~wetness (moderately limited)	0.98 0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Very limited ~too clayey (very limited) ~wetness (moderately limited) ~too acid (slightly limited)	1.00 0.48 0.12	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	1.00 0.53 0.29
Lindley-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Moderately limited ~too clayey (moderately limited)	0.50	Slightly limited ~cutbanks cave (slightly limited)	0.29

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00				
LsD:										
Keswick-----	Limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (limited)	0.98	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~slope (limited)	0.63
							~wetness (moderately limited)	0.48	~too clayey (moderately limited)	0.53
Lindley-----	Moderately limited		Very limited		Very limited		Limited		Limited	
	~shrink-swell (moderately limited)	0.45	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~slope (limited)	0.63	~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.50	~cutbanks cave (slightly limited)	0.29
LwD3:										
Lindley-----	Moderately limited		Very limited		Very limited		Limited		Limited	
	~shrink-swell (moderately limited)	0.45	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~slope (limited)	0.63	~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.50	~cutbanks cave (slightly limited)	0.29
Keswick-----	Limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (limited)	0.98	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~slope (limited)	0.63
							~wetness (moderately limited)	0.48	~too clayey (moderately limited)	0.53
M-W:										
Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
MaC:										
Mandeville-----	Moderately limited		Very limited		Very limited		Limited		Slightly limited	
	~depth to bedrock (moderately limited)	0.52	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~small stones (limited)	0.97	~cutbanks cave (slightly limited)	0.29
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (slightly limited)	0.17		

Howard County, Missouri: Detailed Soil Map Legend

10/03/2001

PAGE - 8 OF 13

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaD: Mandeville-----							~too acid (slightly limited)	0.12		
	Moderately limited		Very limited		Very limited		Limited		Limited	
	~depth to bedrock	0.52	~excess fines	1.00	~excess fines	1.00	~small stones	0.97	~slope	0.63
	(moderately limited)		(thickest layer)		(bottom layer)		(limited)		(limited)	
MaE: Mandeville-----							~slope	0.63	~cutbanks cave	0.29
			~excess fines	1.00	~excess fines	1.00	(limited)		(slightly limited)	
			(bottom layer)		(thickest layer)		~too clayey	0.17		
							(slightly limited)			
MbD3: Mandeville-----	Limited		Very limited		Very limited		Very limited		Very limited	
	~slope	0.67	~excess fines	1.00	~excess fines	1.00	~slope	1.00	~slope	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	~depth to bedrock	0.52	~excess fines	1.00	~excess fines	1.00	~small stones	0.97	~cutbanks cave	0.29
MbD3: Mandeville-----	(moderately limited)		(bottom layer)		(thickest layer)		(limited)		(slightly limited)	
							~too clayey	0.17		
							(slightly limited)			
							~small stones	0.12		
Mc: Marion-----							(slightly limited)			
	Limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	0.86	~excess fines	1.00	~excess fines	1.00	~too clayey	1.00	~wetness	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
MhB: Marshall-----	~shrink-swell	0.75	~excess fines	1.00	~excess fines	1.00	~wetness	0.86	~too clayey	0.76
	(limited)		(bottom layer)		(thickest layer)		(limited)		(limited)	
							~too acid	0.30	~cutbanks cave	0.29
							(slightly limited)		(slightly limited)	
MhB: Marshall-----	Slightly limited		Very limited		Very limited		Moderately limited		Slightly limited	
	~shrink-swell	0.25	~excess fines	1.00	~excess fines	1.00	~too clayey	0.53	~cutbanks cave	0.29
	(slightly limited)		(thickest layer)		(bottom layer)		(moderately limited)		(slightly limited)	

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~too clayey (slightly limited)	0.02
MhC: Marshall-----	Slightly limited ~shrink-swell (slightly limited)	0.25	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Moderately limited ~too clayey (moderately limited)	0.53	Slightly limited ~cutbanks cave (slightly limited)	0.29
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~too clayey (slightly limited)	0.02
MkC: Mcgirk-----	Moderately limited ~shrink-swell (moderately limited)	0.57	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Moderately limited ~wetness (moderately limited)	0.48	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (slightly limited)	0.04	~too clayey (moderately limited)	0.38
									~cutbanks cave (slightly limited)	0.29
MnB: Menfro-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Moderately limited ~too clayey (moderately limited)	0.50	Slightly limited ~cutbanks cave (slightly limited)	0.29
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00				
MnC: Menfro-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Moderately limited ~too clayey (moderately limited)	0.50	Slightly limited ~cutbanks cave (slightly limited)	0.29
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00				
MnD: Menfro-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~slope (limited)	0.63	Limited ~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.50	~cutbanks cave (slightly limited)	0.29
MnD3: Menfro-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~slope (limited)	0.63	Limited ~slope (limited)	0.63

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.50	~cutbanks cave (slightly limited)	0.29
MnE: Menfro-----	Limited		Very limited		Very limited		Very limited		Very limited	
	~slope (limited)	0.67	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.50	~cutbanks cave (slightly limited)	0.29
MoB: Mexico-----	Very limited		Very limited		Very limited		Limited		Very limited	
	~shrink-swell (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~wetness (limited)	0.86	~wetness (very limited)	1.00
	~wetness (limited)	0.86	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~too clayey (limited)	0.79
									~cutbanks cave (slightly limited)	0.29
Mu: Moniteau-----	Limited		Very limited		Very limited		Limited		Very limited	
	~wetness (limited)	0.86	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~wetness (limited)	0.86	~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.37	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.55	~flooding (moderately limited)	0.60
							~too acid (slightly limited)	0.12	~cutbanks cave (slightly limited)	0.29
NaB: Napier-----	Not limited		Very limited		Very limited		Not limited		Slightly limited	
			~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00			~cutbanks cave (slightly limited)	0.29
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00				
Nd: Nodaway-----	Limited		Very limited		Very limited		Not limited		Limited	
	~shrink-swell (limited)	0.84	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00			~wetness (limited)	0.61
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~flooding (moderately limited)	0.60
									~too clayey (moderately limited)	0.45

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NoE: Norris-----	Very limited ~depth to bedrock (very limited) ~slope (moderately limited)	1.00 0.50	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~slope (very limited) ~depth to bedrock (limited)	1.00 0.64	Very limited ~slope (very limited) ~cutbanks cave (slightly limited) ~soft bedrock (slightly limited)	1.00 0.29 0.04
Rock land-----	Not rated		Not rated		Not rated		Not rated		Not rated	
PrB: Pershing-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too clayey (very limited)	1.00	Limited ~wetness (limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	0.95 0.34 0.29
PrC: Pershing-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too clayey (very limited)	1.00	Limited ~wetness (limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	0.95 0.34 0.29
Rw: Riverwash-----	Not rated		Not rated		Not rated		Not rated		Not rated	
Sa: Sarpy-----	Not limited		Probable source		Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too sandy (very limited)	1.00	Very limited ~cutbanks cave (very limited) ~flooding (moderately limited)	1.00 0.60

Howard County, Missouri: Detailed Soil Map Legend

10/03/2001

PAGE - 12 OF 13

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ShB: Sharpsburg-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Slightly limited ~too clayey (slightly limited)	0.17	Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited) ~wetness (slightly limited)	0.29 0.27 0.15
ShC: Sharpsburg-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Slightly limited ~too clayey (slightly limited)	0.17	Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited) ~wetness (slightly limited)	0.29 0.27 0.15
SM: Strip mines-----	Not rated		Not rated		Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
WeB: Weller-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~too clayey (limited) ~too acid (slightly limited)	0.94 0.12	Limited ~wetness (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.95 0.29 0.24
WeC: Weller-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~too clayey (limited) ~too acid (slightly limited)	0.94 0.12	Limited ~wetness (limited) ~cutbanks cave (slightly limited)	0.95 0.29

Howard County, Missouri: Detailed Soil Map Legend

10/03/2001

PAGE - 13 OF 13

Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WnB: Winfield-----	Slightly limited ~shrink-swell (slightly limited)	0.07	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Moderately limited ~too clayey (moderately limited) ~too acid (slightly limited)	0.46	~too clayey (slightly limited)	0.24
									Limited ~wetness (limited)	0.82
									~cutbanks cave (slightly limited)	0.29
WnC: Winfield-----	Slightly limited ~shrink-swell (slightly limited)	0.07	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Moderately limited ~too clayey (moderately limited) ~too acid (slightly limited)	0.46	Limited ~wetness (limited)	0.82
									~cutbanks cave (slightly limited)	0.29
WnD: Winfield-----	Slightly limited ~shrink-swell (slightly limited)	0.07	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Limited ~slope (limited) ~too clayey (moderately limited) ~too acid (slightly limited)	0.63	Limited ~wetness (limited)	0.82
									~slope (limited)	0.63
									~cutbanks cave (slightly limited)	0.29
WnD3: Winfield-----	Slightly limited ~shrink-swell (slightly limited)	0.07	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Limited ~slope (limited) ~too clayey (moderately limited) ~too acid (slightly limited)	0.63	Limited ~wetness (limited)	0.82
									~slope (limited)	0.63
									~cutbanks cave (slightly limited)	0.29